

**Southern Nevada Public Lands Management Act
Capital Improvement Nomination
Round 4**

**OLIVER RANCH SCIENCE SCHOOL COMPLEX
AND WILD HORSE AND BURRO FACILITY**

1. General Description of the Project

Oliver Ranch is a 300-acre parcel acquired by the Bureau of Land Management (BLM) in 1993 and incorporated into the Red Rock Canyon National Conservation Area (RRCNCA). The BLM's proposed General Management Plan (Dec., 2000) for the RRCNCA states that the development of an environmental education center is a primary consideration for this site. A feasibility study (included) has been completed and detailed analysis supports the suitability of Oliver Ranch for such an environmental education role.



Oliver Ranch

Desert regions are a major world ecosystem covering approximately 20% of the Earth's land area. The Mojave Desert, the primary educational and scientific focus of this project, covers approximately 30,000 square miles, roughly the size of Maine. The RRCNCA is one of the most beautiful and unique areas in this remarkable arid environment. The expanse of the Mojave Desert and the RRCNCA contain an extensive variety of habitats, species, and land forms, all of which enhance the suitability of this site for the study and experience of desert ecosystems.

The Oliver Ranch project would result in the creation of the Oliver Ranch Science School (ORSS) complex, which would include a residential science school, a field research station, an astronomical observatory, and a Wild Horse and Burro (WHB) facility. The ORSS complex would incorporate state-of-the-art sustainable design concepts that are appropriate for an arid land environment. "Green" architectural and engineering features are to be used to the maximum possible extent in construction of the facilities. Specifically, the use of solar and wind power, an advanced wastewater treatment plant, and the utilization of environmentally friendly building materials will ensure that the buildings themselves reflect environmental responsibility. Educational materials, displays, and programming on these sustainable design features will integrate the concept of environmentally responsible building into the learning experience for visitors to the complex. In addition, every effort will be made to utilize the previously disturbed areas of the ranch site and retain or preserve some of the existing ranch structures.

The major building components of the Oliver Ranch Science School complex will include:

- Administration and Staff Offices
- Residential Living Facilities:
 - A maximum of 250 beds
 - Dining and kitchen areas
 - Restroom facilities, including showers
 - Laundry outbuildings
- Classroom and Research Facilities, including:
 - Conference Rooms
 - Laboratories
 - Astronomical Observatory
 - Environmental Monitoring and Weather Field Stations
- Waste Water Treatment Plant
- Equipment Storage Outbuildings
- Electrical, Mechanical and Maintenance Shop
- Parking Areas

In conjunction with funding for the ORSS, funding is requested for the new WHB facility, which will be part of the ORSS complex. The new WHB facility will replace and greatly improve upon the existing corrals at Oliver Ranch. The new WHB site is approximately .5 miles from Oliver Ranch. Although the major anticipated missions of the WHB facility will be distinct from those of the proposed ORSS complex, there will be crossover with the school's curriculum, and an educational component will be an integral part of the new WHB program.



Feral Burro near Oliver Ranch

The primary elements of the WHB facility-building program include:

- Resident Horse Barn - Accommodating six horses, with a tack room
- Holding Corral
- Animal Infirmary - For 4 horses, with a bunk room
- Pasture - Fenced, flexible usage, approximately 2 acres
- Hay Storage - Approximately 3 months storage for 25 horses
- Helipad - with 90-foot diameter "safety circle"
- Amphitheater/Arena - For special riding events, but flexible for use in other types of demonstrations, adoptions, classes and shows, seating for 100
- Office - With 4 to 5 work spaces and small conference space
- RV Site with Utilities - For seasonal use by a single resident
- Equipment Garage - For one ATV with trailer and one tractor
- Outdoor Gathering Space - For barbecues and similar social events
- Parking - For staff, public, trucks, equipment and special events

2. The Approximate Cost of the Project: \$22,405,998

Oliver Ranch Science School Complex -- Preliminary Adjusted Budget Summary (See Appendix A for original budget details.)

| Component | Cost | Total |
|---|-----------|-------------------|
| PROGRAM AREAS | | |
| Entry and Admission | 438,000 | |
| Fitting and Laundry | 264,000 | |
| Residential | 4,028,625 | |
| Dining and Kitchen | 1,155,000 | |
| Classrooms and Laboratories | 1,534,000 | |
| Observatory | 800,000 | |
| Wild Horse and Burro Program (distinct from WHB facility) | 76,000 | |
| Electrical and Maintenance | 232,000 | |
| Waste Water Treatment | 160,000 | |
| General On-Site | 3,375,500 | |
| General Off-Site | 475,000 | |
| PROGRAM SUBTOTAL | | 12,538,125 |
| | | |
| ADDITIONAL COSTS | | |
| Contractors Fees | 1,940,718 | |
| Other Fees and Project Costs | 1,286,523 | |
| Equipment and Interiors | 864,000 | |
| BUILDING SUBTOTAL | | 4,091,241 |
| Project Contingency – 10% of costs | 1,662,937 | 1,662,937 |

Total Costs

\$ 18,292,303

(Note: Not included are land costs, construction interest, and owner's insurance)

Wild Horse and Burro Facility Preliminary Budget Summary (See Appendix A for details.)

| | | |
|------------------------------------|---------|------------------|
| Resident Horse Barn | 155,000 | |
| Amphitheater and Arena | 575,000 | |
| Office | 175,000 | |
| Holding Pens/Chutes | 78,000 | |
| Corral | 115,000 | |
| Animal Infirmary | 617,000 | |
| Pasture | 60,000 | |
| Miscellaneous Facilities | 133,000 | |
| General On-Site | 895,000 | |
| General Off-Site | 202,000 | |
| FACILITY SUBTOTAL | | 3,005,000 |
| Project Contingency – 10% of costs | 300,500 | |
| Fees | 808,195 | |

Total Costs

\$4,113,695

(Note: not included are land costs, construction interest, and owner's insurance)

3. Operation and Maintenance Requirements

Cooperative Agreements will be developed between the BLM and the contractors selected to directly operate and maintain the ORSS complex, including the WHB facility. It is likely that more than one contractor will be required to operate the various facilities within the ORSS complex – one contractor would operate the ORSS and another would operate the WHB facility. The Cooperative Agreements will describe in detail the responsibilities and roles of each party entering into the agreement. The Cooperative Agreement will be the vehicle for establishing accounts for utilities, maintenance, insurance, and indemnity and other prescriptive requirements that may be specified by the BLM. The operating entities will be experienced, competent, non-profit, education-focused organizations.

The operating entity for the proposed ORSS can expect a revenue stream derived from fee-based programs, scholarship support, fundraising activities, and in-kind donations. Additional revenue will be provided by grants available from both private philanthropic foundations and various governmental agencies. Preliminary *pro forma* budget projections yield operating surpluses after the second year of operation. Other revenue streams are expected from supplemental programming in connection with community field seminars, astronomy programs, special events, conferences and retreats, and a retail gift store.

At this time, an operating organization has not yet signed a Cooperative Agreement. The Outside Las Vegas Foundation (OLVF) has been acting as a facilitating entity, coordinating the Oliver Ranch feasibility study, conducting initial fundraising efforts, and supporting federal land management partnerships. The OLVF (as the primary interagency, private/non-profit partner to the four federal land management agencies) will continue its commitment to this project and is confident in its ability to attract the necessary community support for the long-term success of the ORSS.

Monies to operate the WHB facility will derive from the BLM through the National Wild Horse and Burro Program. Private fundraising and in-kind contributions from non-profit support organizations and from governmental and private grants will supplement these monies.

4. Nomination Assessment

*4-1. Does this project improve safety for visitors and/or employees? **Yes.***

It is anticipated that the proposed ORSS will have long-term positive impacts on safety. Components of the proposed ORSS curriculum will focus on how to appreciate the desert in an appropriate and safe manner. Students of the ORSS and visitors shall be either existing or potential users of the public lands, thus safety education will result in more responsible use by this group. Furthermore, friends, relatives, and parents of the students and visitors could potentially be influenced by what individual students have learned.

Robust on-the-job safety measures for faculty and staff of the proposed ORSS complex will be defined and rigorously encouraged. In addition, all hikes, destinations, activities,

equipment and facilities will be constantly monitored to ensure that faculty, staff and student safety remains a priority.

4-2. Does this project provide more or improved visitor facilities to meet increasing demands, and changing demographics? Yes.

The proposed ORSS complex will be the only residential, environmental education and research center in a managed National Conservation Area. It is anticipated that the studies conducted and educational opportunities provided at the proposed ORSS complex will strongly influence the understanding of fragile desert ecosystems. The facilities constructed with this funding request will have a multi-purpose function. In conjunction with its mission-related environmental education uses, the proposed ORSS complex has additional applications including serving to host conferences and special programs and offers an alternative site for some activities currently being offered at the Visitor Center. Examples of additional applications include:

- With the completion of the ORSS Observatory, the astronomy programs currently offered at the RRCNCA Visitor Center would have the option to expand in scope and participation. The current RRCNCA astronomy programs are increasing in popularity even though facilities are very limited, suggesting that a market exists for expanded programming of this nature.
- Clark County has a large and growing senior and retired population. The future ORSS complex is a viable host for Elderhostel programs.
- The proposed ORSS Greenhouse will allow Master Gardeners to both expose visitors to native plant restoration projects and conduct special community classes on native plant horticulture.

4-3. Does this project provide more/improved educational opportunities? Yes.

Environmental Education as a Priority

Environmental Education is one of the highest priority focus areas identified by the Outside Las Vegas Federal Partnership, which consists of the Bureau of Land Management (BLM), National Park Service, U.S. Forest Service and U.S. Fish and Wildlife Service. Ranging from the lush forested alpine environment to the nation's largest man-made lake to desert landscapes – seven million acres of public lands in Southern Nevada converge to form a unique setting for a large North American urban area. Included in these spectacular landscapes are eight Congressionally designated areas managed by the four federal land managing agencies plus three million acres of BLM public land. These lands and waters contain one of the most diverse arrays of plants and animals on the planet with over 1,000 species of plants, 400 species of birds, 142 species of mammals, 54 species of reptiles and 41 species of fish. There is also an impressive array of both historic and prehistoric sites of national significance. This exceptional assemblage so close to where 1.6 million people reside offers an unparalleled potential for environment-based education programs to improve and directly influence student learning. Environmental education, *in situ*, is an ideal integrating context for learning

about not only the ecological issues faced locally within the Mojave Desert, but also about those challenging the United States as a whole.

The need for environmental education is particularly acute in Southern Nevada. The Las Vegas metropolitan area has been the fastest growing urban area in the country for the past decade, with a resident population now exceeding 1.6 million and tourist visitation at over 36 million per year. There are approximately 5,000 new residents moving to Las Vegas every month. Over 900,000 new residents have moved to the area since 1990. Unfortunately, many of Las Vegas' residents do not appear to have an understanding of the natural environment that surrounds their city nor a sense of responsibility for its condition. The pressures of the population explosion, increasing visitor volume, and urban interface and encroachment are creating tremendous management challenges for the federal land management agencies. These challenges take the form of increased desert dumping, litter, graffiti, and illegal uses of the federal lands, which affect sensitive species and their habitats. Much of these abuses to the public lands stem from ignorance rather than malicious intent. The most powerful tool for sustaining our public land areas and combating these abuses is through involvement and education.

To help facilitate environmental education initiatives, the Outside Las Vegas Federal Partnership asked the Outside Las Vegas Foundation (OLVF), its primary interagency non-profit partner, to establish a broad-based Environmental Education Committee. One of the roles of this Committee, which consists of 19 partner organizations, is to develop a comprehensive strategy for environmental education across the seven million acres of federal land. Although the planning process is still underway, the Committee strongly supports the concept of a residential environmental science field school at Oliver Ranch. They believe the ORSS will serve as an integral component within a comprehensive program for Southern Nevada. Likewise, the Outside Las Vegas Federal partners support the ORSS. Although the proposed ORSS complex is located on BLM land within the Red Rock Canyon National Conservation Area, the Federal partners foresee the contribution of the ORSS to a long-range comprehensive program that benefits all public lands.

In addition, one of the goals of the "Partnership for Excellence in Mathematics, Science, Engineering and Technology Education" is to capitalize on the community's unique surroundings and build capacity to support both formal and informal learning by K-16 educators and students on the public lands. The purpose of this Partnership is to strengthen mathematics science and technology education for all students in Southern Nevada. The Partnership includes: Clark, Esmeralda, Lincoln, and Nye County School Districts; Nevada Department of Education; University of Nevada Las Vegas; Desert Research Institute; KLVX (a PBS affiliate); Community College of Southern Nevada; and the Outside Las Vegas Foundation. The Partnership recognizes the value of on-site field ecology education in supporting classroom efforts and believes that integrated field-based education is realistic and will be a successful part of the solution to better student and teacher performance.

The positive results achieved across the country in efforts to utilize the environment as an integrating context for learning such as is proposed at the ORSS are documented in a report entitled "Closing the Achievement Gap-Using the Environment as an Integrating

Context for Learning” by Gerald A. Lieberman and Linda L. Hoody (1998; State Education and Environment Roundtable). In their study, Lieberman and Hoody suggest use of the environment not only improved performance on standardized measures of academic achievement, but also reduced discipline and classroom management problems and increased student engagement. Furthermore, the Yosemite National Institutes, which operates three science field schools that are similar to the proposed ORSS, contracted a 1999 Stanford University assessment of their operations; the Stanford analysis findings were analogous to those described within the Lieberman and Hoody report.

Oliver Ranch Science School

The proposed ORSS will fill an important niche, lacking in the educational programming currently offered in the Las Vegas community and on the surrounding public lands. There is no residential field school in Southern Nevada and very few study centers for arid lands exist in the United States. Preliminary market analysis (see attached feasibility study for details) recommends that programs of three days in length be offered to target groups. By the fifth year of operation, approximately 14,400 students per year could be accommodated including about 11,500 10 to 13 year olds. In the year 2005 there will be over 87,000 students in this age group in Clark County alone and over 125,000 such students statewide. The potential market far exceeds the school’s projected capacity. It is anticipated that the ORSS field science school programs would be conducted 36 weeks each year. In addition to usage for core programs, it is envisioned that the ORSS complex will be used for teacher training, community field seminars, Elderhostel, and inter-generational programs, nighttime astronomy programs, wild horse and burro education programs, special events, conferences, and retreats.

The ORSS will teach participants about the natural world through inquiry-based experiential and interdisciplinary methods. The intent is for the participants to gain an appreciation of desert ecosystems and to begin to apply their knowledge of ecological interconnection to world ecological systems. The hands-on science instruction will be conducted in an advocacy-free environment. Students will be encouraged to develop their own conclusions about how environmental stewardship fosters the continued existence of the natural world and the sustainability of resource use.

The residential component and on-site laboratory and classroom facilities of the ORSS will provide educators with the necessary time and organization to maximize the exploration of topics. At the ORSS complex students will be able, in one setting, to make ecological observations, discuss hypotheses, observe and participate in data collection, perform analyses to generate results, and discuss conclusions (i.e., utilize the scientific method). Within the confines of the day programs currently conducted on public lands with packed-in or no scientific gear, the curriculum available is clearly limited and less robust than what is possible at the proposed ORSS. In addition to gaining ecological and environmental knowledge and that of the associated research practices and technologies, students will concurrently be engaged and challenged in the areas of leadership, communication skills, and problems solving, as well as community and diversity. The subject matter taught at the proposed ORSS will be correlated to the Clark County School

District curriculum and standards, helping educators to continue science education in their own classrooms.

The Desert Research Institute (DRI), part of the University and Community College System of Southern Nevada, proposes to conduct applied environmental research (e.g., spring restoration and ecology; weather and climate; long-term air quality and visibility; and dry lands ecology restoration) at and around the proposed ORSS. DRI has a national and international reputation for basic and applied research, and its research scientists can make expert contributions to curriculum development at the ORSS. Socially relevant environmental research is important for students and teachers. Students of all age groups and K-12 teachers will be able to participate in actual research and then study the results in their own classrooms. In addition, interactive learning programs can be developed to share information and experiences with students from across the United States. Scientific collaboration with other arid-land study centers could eventually be implemented, both nationally and internationally.

The ORSS will include various instrument packages that will allow for real-time monitoring and display of collected data. For convenience and continuity, large-scale data collection will be automated, but most measures could easily be taken manually by students to demonstrate technology and provide immediate data for classroom discussion. The field science school programs coupled with applied environmental research will provide powerful learning tools for students and teachers alike.

The Oliver Ranch Science School Observatory

The proposed ORSS Observatory will offer significant opportunities for astronomy education through tours, multimedia programming, and other educational activities and events. The facility will include both a primary telescope and adjacent pads to support portable telescopes. The control room will have computer support for the primary telescope as well as broadband Internet access to control telescopes at remote sites. The proposed ORSS Observatory primary facility is designed to accommodate groups of around 30 students per session. And, it is anticipated that the ORSS Observatory will provide access to its primary telescope via the Internet, and thus will be accessible to students and teachers around the world.

This facility will be integrated into the ORSS school programs and will be available for special evening and weekend programming. Visiting the observatory will provide a vigorous educational experience that will encourage the study of astronomy and will increase understanding of the universe. The proposed ORSS Observatory will also include Internet-based outreach programs (e.g., electronic newsletters) as well as web-based virtual tours and activities. The proposed facility will be well suited to interface with other national and international astronomy education programs.

The Wild Horse and Burro Facility

The WHB facility offers an exceptional opportunity to educate the public about the National Wild Horse and Burro Program and the challenges of maintaining these animals in ecological balance. The proposed WHB facility will be the only such facility in the country, and it is anticipated that education will be a principal role of the facility. Wild horses and burros are naturalized species common within the Red Rock Canyon National Conservation Area. The Oliver Ranch site is currently an active Herd Management Area with horses and burros living in the immediate vicinity. The adoption program, which places tamed or gentled animals into private ownership is not well known in the area. The ORSS students and visitors will be exposed to three levels of learning opportunities related to the National Wild Horse and Burro Program. First, participants will have the opportunity to observe and learn about the gentled animals within the corrals. Second, these animals are likely to be encountered in the field either by actual sightings or indirectly through tracks or scat on trails, providing further opportunity for discussion. Thirdly, the WHB facility will be a destination for groups to observe the gentling process and adoption program.

The ‘Built Environment’

The entire ORSS complex will be designed as a green facility, which incorporates sustainable features in the design and operation (see 4-4, below and Appendix B for details). As such, the built environment will also be used as part of the learning experience.

*4-4. Does this project protect the integrity of significant resources values or improve the quality of the environment? **Yes.***

The issue of Carrying Capacity will be vigorously addressed through management plans to mitigate unwanted impacts. According to the General Management Plan, the RRCNCA hosts the two federally - listed threatened and endangered species, and 43 other species of concern. The presence of these species will require careful management to avoid student impact, but the fact that the RRCNCA contains such important species provides powerful learning opportunities for students.

Opportunities for stewardship involvement will be made available. A potential exists for collaboration with the University of Nevada Cooperative Extension to build and operate a greenhouse on the Oliver Ranch site. It is anticipated that native plant propagation and restoration projects will be part of the curriculum. Additional stewardship activities could include trail building, litter and graffiti removal, and the removal of invasive non-native plants.

The ORSS will present unique opportunities for students to become involved in long-term biomonitoring and other research projects. To learn about fundamental ecological issues under study at the field station, experimental results, and more importantly, real time discussions based upon the results, method of study, and the significance of the studies can

be shared with students throughout the community, state, and country through interactive learning processes.

Oliver Ranch ORSS also has the potential of becoming a regional training center for Federal Leave No Trace (LNT) programs. LNT techniques designed specifically for arid lands would help alleviate land manager concerns about impacts on the desert ecosystem. This training strengthens the stewardship message for both students and teachers.

It is important to note that the buildings of the proposed ORSS complex will reflect the mission of this facility in teaching environmental responsibility by both utilizing sustainable design features and incorporating the building design into a tangible learning experience. The proposed school complex will promote a 'sense of place' that is unique to both the immediate Oliver Ranch site and to the regional desert landscape. Architectural learning opportunities at the ORSS range from appropriate building placement in relation to the sun to sophisticated wastewater treatment technologies. The *LEED Green Building Rating System*[™] (the industry standard for rating buildings in terms of energy and environmental performance) and the *Energy Design Guidelines for High Performance Schools in Hot and Dry Climates* guided the proposed concepts for development (see Appendix B for details). Furthermore, careful design measures will ensure that the visual aesthetics of the site will be preserved. When implementing these concepts, a concerted effort will be made to make them part of the learning experience (i.e., to teach how the built environment can be environmentally responsible).

*4-5. Does this project improve the efficiency and effectiveness of natural resource management activities? **Yes.***

Oliver Ranch Complex

The Oliver Ranch Complex improves the efficiency and effectiveness of the natural resource management activities in several ways. Primarily, it is anticipated that the complex will become a nationally, and perhaps internationally, significant environmental and science educational venue as well as an important field research facility. Education is critical to developing and maintaining the public's support for natural resource management programs. On local terms, over 900,000 people have moved into the Las Vegas community since 1990. Many of these new residents appear to have very little understanding and appreciation of our desert systems. Impacts and disturbances to these natural systems likely result from a lack of understanding and appreciation of our natural resources. By providing a broad range of educational activities, we intend to build community awareness and support for the natural resource management programs already in place. It follows that this awareness and support, in turn, will reduce impacts to the public lands.

Wild Horse and Burro (WHB) Facility

The Wild Horse and Burro (WHB) Facility component will directly enhance the efficiency and effectiveness of natural resource management activities in that it assembles, in one location, all of the operational elements of the WHB Program. The existing corrals at Oliver Ranch are used as a temporary holding site for wild horses and

burros collected from gathers and for occasional adoptions. This inefficient facility must be replaced in order to meet the operational needs of the WHB Program. Oliver Ranch is situated within the Red Rock Herd Management Area, a site that contains both wild horses and burros. The WHB Facility will be a permanent holding and processing site. The proximity of the proposed facility to nearby Head Management Areas will allow for minimal transportation, processing, and adoption cost. Regular pre-and post-adoption clinics will be held at the facility to prepare new owners for the responsibilities inherent in the adoption of a wild horse or burro, and help foster long successful relationship between new owners and their adopted animals. The facility will also relieve the overcrowding of other long-term holding facilities and increase the number of potential adoptions in Southern Nevada. In addition, a potential exists to reach untapped markets for adoptions due to the high-profile nature of the proposed Oliver Ranch Complex and its associated programs. Such exposure would be beneficial to the BLM and the National Wild Horse and Burro Program.

The infirmary component of the WHB facility will allow for the treatment and care for injured adult horses and orphaned infant wild horses and burros on site. A holding area within the facility will reduce the stress of long-distance hauling currently required of Las Vegas area wild horses and burros in transport to the Ridgecrest, Kingman and Palomino Valley Center holding facilities. The location of the Oliver Ranch WHB Facility will expedite animal care and reduce casualty potential during periods when extreme conditions exist. The WHB Facility and associated programs, once in place, will be the only such facility of this kind in the country. This facility will offer unique environmental education opportunities in the area of maintaining an ecological balance between wild horses and burros and their environment.

Also, the research laboratory component of the Environmental Education Field School presents another outstanding opportunity for integrating environmental education and research. Combining quality environmental education with “real world” research projects can help promote increased understanding and stewardship of public lands. The Desert Research Institute proposes to conduct applied environmental research at and around the proposed Oliver Ranch Environmental Education School. This research will be utilized in the development of environmental science education curriculum at the proposed ORSS and will be conducted in close collaboration with agency educators and program managers.

*4-6. Does this project involve significant funding partnerships is land acquisition, development or management? **Yes.***

The project has assembled critical partners (below) who will contribute to funding the facility and the programming.

Outside Las Vegas Foundation

The Outside Las Vegas Foundation has agreed to:

- 1.) Facilitate fundraising to support those elements of the complex that are not eligible for Southern Nevada Public Lands Management Act Funds (e.g., computers and

- peripherals, consumable supplies, kitchen ware, laboratory ware and equipment, furniture, linens, tools, vehicles and all other accessories necessary for the successful operation of a high caliber facility);
- 2.) Secure monies for an endowment to help cover operation and maintenance costs;
 - 3.) Secure scholarship monies needed to assure that the facility serves the needs of the entire community.

Red Rock Canyon Associations

The Red Rock Interpretive Association and the Friends of Red Rock Canyon have each pledged \$10,000 per year for scholarships once the facility is built.

Clark County School District

The Clark County School District is supports the proposed ORSS complex concept. Although they have not committed funding to this project, they indicate a possibility of financial support once the facility is built.

Equine Associations

The National Wild Horse Association, Nevada Commission for the Preservation of Wild Horses and the Wild Horse Foundation indicate a desire to assist in fundraising and programming.

Local Scientific Research Community

As noted in the response to Question 3-5 (above), The Desert Research Institute (DRI) plans to conduct applied environmental research in connection with the proposed ORSS. DRI has a national and international reputation for basic and applied research and its scientists can lend professional expertise to the proposed ORSS curricula. The DRI has committed to help raise funds for the various instrumentation packages allowing for the real time monitoring and display of collected data.

The Las Vegas Astronomical Society (LVAS), in cooperation with the planetarium at the Community College of Southern Nevada (CCSN) and the CCSN science faculty, have also offered their assistance. The LVAS will provide volunteer labor for programming. The Planetarium and faculty will provide technical support to insure the effective use of the astronomy facilities that are built.

The University of Nevada Las Vegas Marjorie Barrick Museum of Natural History and its research division, the Harry Reid Center for Environmental Studies, have offered full support and assistance to the project. The Marjorie Barrick Museum with its staff and collections will help support herpetological, ornithological, archaeological, and general ecology programs. The Harry Reid center will provide expertise in a variety of areas for programming and research support.

Federal Planning Organizations

The National Park Service's Denver Service Center and the Bureau of Land Management's Science and Technology Center have contributed planning and technical support to the ORSS complex project. Both organizations have pledged their continued support as planning continues. For example, they are investigating the possibility of

seeking grants from the Department of Energy (and others) for the alternative energy and “green” elements of the project.

*4-7. Does this project meet multi-agency goals or has multi-agency support? **Yes.***

The project meets both multi-agency goals and has multi-agency support. Environmental education is one of the high-priority focus areas for the Outside Las Vegas Federal Partnership. This was the result of a strategic planning process taken by the partnership in December 2001. The National Park Service, U.S. Fish and Wildlife Service, Bureau of Land Management and the U.S. Forest Service all support this project. These agencies will begin a collaborative effort to achieve their common goals of resource protection, environmental interpretation and education. The proposed ORSS will play a key role in accomplishing these goals by greatly expanding the opportunities for environmental education and by expanding the opportunity for partnership between the federal agencies and the private sector. The Oliver Ranch site was selected based upon established criteria by the four agencies. Of all sites considered, the Oliver Ranch site best met the criteria.

*4-8. Does this project have the support of state and local governmental and/or other interested parties? **Yes.***

Various environmental, educational and scientific organizations have expressed support for this project (see included letters of support). These organizations include the Clark County School District, Friends of Red Rock Canyon, Desert Research Institution, University of Nevada Cooperative Extension, Community College of Southern Nevada, National wild Horse Association and the Barrick Museum of Natural History

Faculty, staff and professionals from the above organizations have already donated their time and expertise to help complete the feasibility study. The Friends of Red Rock Canyon have also donated \$10,000 to help fund the study and have pledged an additional \$10,000 for environmental education scholarships for at risk students.

Appendix A
Preliminary ORSS Budgets – Calculated for 250 residents
 (Appendix VI of the Oliver Ranch Feasibility Study)

PROGRAM COMPONENTS

| ENTRY & ADMINISTRATION: | CAPACITY | SQ. FT./PERSON | INT. SQ. FT. | EXT. SQ. FT. | \$/ SQ. FT. | COST | TOTAL |
|---|-----------------|-----------------------|---------------------|---------------------|--------------------|-------------|------------------|
| Entry, Gift Shop, Administration | | | 1,900 | | \$150 | \$285,000 | |
| Teachers' Lounge - computer, phone, kitchenette | 20 | 20 | 400 | | \$120 | \$48,000 | |
| Staff Prep Room - computer, phone, lockers, storage | 20 | 40 | 750 | | \$120 | \$90,000 | |
| Infirmary | 2 | | 150 | | \$100 | \$15,000 | |
| Sub-Total: | | | 3,200 | | | | \$438,000 |

| FITTING & LAUNDRY: | CAPACITY | SQ. FT./PERSON | INT. SQ. FT. | EXT. SQ. FT. | \$/ SQ. FT. | COST | TOTAL |
|---------------------------------------|-----------------|-----------------------|---------------------|---------------------|--------------------|-------------|------------------|
| Fitting Room - Desert Gear Outfitting | | | 900 | | \$120 | \$108,000 | |
| Storage | | | 500 | | \$120 | \$60,000 | |
| Laundry | | | 300 | | \$120 | \$36,000 | |
| Miscellaneous | | | 500 | | \$120 | \$60,000 | |
| Sub-Total: | | | 2,200 | | | | \$264,000 |

| RESIDENTIAL: | CAPACITY | SQ. FT./PERSON | INT. SQ. FT. | EXT. SQ. FT. | \$/ SQ. FT. | COST | TOTAL |
|---|-----------------|------------------------------------|---------------------|---------------------|--------------------|-------------|--------------------|
| Staff Beds(On-Site) | 3 | 465 | 1,395 | | \$125 | \$174,375 | |
| Guest Housing Beds | 36 | 145 | 5,220 | | \$150 | \$783,000 | |
| Student Beds | 204 | 105 | 21,420 | | \$125 | \$2,677,500 | |
| Chaperone Beds | 30 | 105 | 3,150 | | \$125 | \$393,750 | |
| Sub-Total: | 273 | | 31,185 | | | | \$4,028,625 |
| Program Notes: | | | | | | | |
| | | Typical School Group Sizes: | | | | | |
| 1 Chaperone/8 Students | | 66% - 12-40 Students | | | | | |
| 4-6, or 8 Beds/Student Room | | 23% - 41-80 " | | | | | |
| 2-4 Beds/ Chaperone Room | | 3% - 80-100 " | | | | | |
| Dorms Include: Entry, Lounge, Bathroom, Storage | | 8% - 101-240 " | | | | | |
| 40 Beds/Dorm - 4200 Sq. Ft. (Max. Size) | | | | | | | |

| DINING & KITCHEN: | CAPACITY | SQ. FT./PERSON | INT. SQ. FT. | EXT. SQ. FT. | \$/ SQ. FT. | COST | TOTAL |
|------------------------------------|-----------------|-----------------------|---------------------|---------------------|--------------------|-------------|--------------------|
| Kitchen, Dining, & Recycling/Trash | 150 | | 7,200 | | \$150 | \$1,080,000 | |
| Loading & Trash/Recycling | | | | 3,000 | \$25 | \$75,000 | |
| Sub-Total: | 150 | | 7,200 | 3,000 | | | \$1,155,000 |

| CLASSROOMS & LABS: | CAPACITY | SQ. FT./PERSON | INT. SQ. FT. | EXT. SQ. FT. | \$/ SQ. FT. | COST | TOTAL |
|--|-----------------|-----------------------|---------------------|---------------------|--------------------|-------------|--------------------|
| Large Multi-Use Classroom - Divisible into 2 | 140 | 15 | 2,100 | | \$150 | \$315,000 | |
| Desert Plants/Xeriscape Lab | 15 | 30 | 450 | | \$200 | \$90,000 | |
| Desert Animals Lab | 15 | 30 | 450 | | \$200 | \$90,000 | |
| Geology Lab | 15 | 30 | 450 | | \$200 | \$90,000 | |
| Native Peoples Lab | 15 | 30 | 450 | | \$200 | \$90,000 | |
| Wet Lab | 15 | 30 | 450 | | \$250 | \$112,500 | |
| Hall of Environmental Heroes | 65 | 15 | 975 | | \$200 | \$195,000 | |
| Library/Tech Room | 65 | 15 | 975 | | \$150 | \$146,250 | |
| Art Room | 65 | 15 | 975 | | \$150 | \$146,250 | |
| Greenhouse | 15 | 8 | 120 | | \$75 | \$9,000 | |
| Weather Station | | | | 900) | | | |
| Air Quality Monitoring | | | | 200) ASSUME | | | |
| Water Monitoring | | | | 75) FOR | | \$150,000 | |
| Ground Water Testing | | | | 100) ALL | | | |
| Soil Testing | | | | 100) | | | |
| Sub-Total: | 425 | | 7,395 | 1,375 | | | \$1,434,000 |

| OBSERVATORY: | CAPACITY | SQ. FT./PERSON | INT. SQ. FT. | EXT. SQ. FT. | \$/ SQ. FT. | COST | TOTAL |
|--|-----------------|-----------------------|---------------------|---------------------|--------------------|-------------|------------------|
| Main Telescope Room - 15 Ft. Dia. Dome | | | 305 | | | | |
| Control Room | | | 110 | | | | |
| Meeting Room | | | 675 | | | | |
| Storage | | | 110 | | | | |
| Outdoor Observing Pad - 8 Sunlens | | | | 1200) | | | |
| Sub-Total: | | | 1,200 | 1,200 | | | \$800,000 |

| WILD HORSE & BURRO PROGRAM: | CAPACITY | SQ. FT./PERSON | INT. SQ. FT. | EXT. SQ. FT. | \$/ SQ. FT. | COST | TOTAL |
|--|----------|----------------|--------------|--------------|-------------|----------|----------|
| On-Site Facilities | | | | | | | |
| Covered Stable, Feed, Tack, & Storage | | | 800 | | \$50 | \$40,000 | |
| Round Pens, Trailer Access & Parking | | | | 7,200 | \$5 | \$36,000 | |
| Students take or take ours to full facility at Borate Springs turn off | | | | | | | |
| Sub-Totals | | | 800 | 7,200 | | | \$76,000 |

| ELECTRICAL & MAINTENANCE: | CAPACITY | SQ. FT./PERSON | INT. SQ. FT. | EXT. SQ. FT. | \$/ SQ. FT. | COST | TOTAL |
|---------------------------|----------|----------------|--------------|--------------|-------------|-----------|-----------|
| Totler | | | 50 | | \$100 | \$5,000 | |
| Control | | | 100 | | \$100 | \$10,000 | |
| Office | | | 120 | | \$100 | \$12,000 | |
| Maintenance | | | 600 | | \$100 | \$60,000 | |
| Electrical | | | 300 | | \$100 | \$30,000 | |
| Telephone/Data | | | 150 | | \$100 | \$15,000 | |
| Storage | | | 1,000 | | \$100 | \$100,000 | |
| Sub-Totals | | | 2,320 | | | | \$232,000 |

| | | | | | | | |
|---|--|--|--|--|--|--|--|
| Mechanical & Electrical Systems Notes: | | | | | | | |
| Battery Room - In each Building | | | | | | | |
| Water Storage - In each Building | | | | | | | |
| Hot Water Storage - In each Building | | | | | | | |
| A/C - In each Building | | | | | | | |
| Photovoltaic Cells - In each Building | | | | | | | |
| On-Site Generator - Fuel Cell (Kitchen) | | | | | | | |
| Wind - Well Water Pumping or Power Generation | | | | | | | |

| WASTE WATER TREATMENT: | CAPACITY | SQ. FT./PERSON | INT. SQ. FT. | EXT. SQ. FT. | \$/ SQ. FT. | COST | TOTAL |
|--------------------------------|----------|----------------|--------------|--------------|-------------|-----------|-----------|
| Pit, Tank, Pump, Storage Tanks | | | 1,600 | | \$100 | \$160,000 | |
| Service Picking & Sump Area | | | | | | | |
| Leaching Field | | | | | | | |
| Sub-Totals | | | 1,600 | | | | \$160,000 |

| GENERAL ON-SITE: | CAPACITY | SQ. FT./PERSON | INT. SQ. FT. | EXT. SQ. FT. | \$/ SQ. FT. | COST | TOTAL |
|---|----------|----------------|--------------|--------------|-------------|-------------|-------------|
| Covered Entry/ Drop Off Area | | | | | | | |
| Loading/unloading Canopy - Covered W/ Mister | 250 | 8 | | 2,000 | \$100 | \$200,000 | |
| Luggage Storage - Covered, Secure | 250 | 5 | | 1,250 | \$100 | \$125,000 | |
| Vehicle Drop Off Loop | | | | 8,000 | | | |
| Sub-Total | | | | 11,250 | | \$325,000 | |
| On-Grade Parking | | | | | | | |
| Vans - Electric, Covered Area | 7 | 400 | | 2,800 | \$5 | \$14,000 | |
| Staff | 20 | 350 | | 7,000 | \$5 | \$35,000 | |
| Visitor | | | | | | | |
| Bicycle | | | | 300 | \$5 | \$1,500 | |
| School Buses - Drop Off Loop Only | | | | | | | |
| Total Parking Spaces | 27 | | | | | | |
| Sub-Total | | | | 10,100 | | \$50,500 | |
| General | | | | | | | |
| Demolition & concrete wall repair in existing buildings | | | | | ASSUME | \$100,000 | |
| Leach Field Removal | | | | | ASSUME | \$25,000 | |
| Site work: underground utilities, grading, septic, lighting, irrigation, minimum landscaping, signage | | | 10.5 | acres at | \$200,000 | \$2,100,000 | |
| Septic Gray Water System | | | | | ASSUME | \$350,000 | |
| Diesel Generator - Standard | | | | | ASSUME | \$125,000 | |
| Kitchen Equipment | | | | | ASSUME | \$150,000 | |
| Decks & Walkways - over drainage | | | | | ASSUME | \$50,000 | |
| Rock Wall Allowance | | | | | ASSUME | \$50,000 | |
| Amphitheater - Outdoor, Natural/Rustic, Stage, Firepit | 250 | 12 | | 3,000 | | \$50,000 | |
| Water Stor. Tank - Fire/Domestic - 10,000 Gal. - 15' Dia. | | | | 225 | | \$15,000 | |
| Sub-Total | | | | | | \$3,000,000 | |
| Sub-Totals | | | | | | | \$3,175,500 |
| Misc. Notes | | | | | | | |
| Fire Access - 14 - 18' Wide Road (Within 350' of all buildings) | | | | | | | |
| ADA - 5% maximum slope | | | | | | | |
| Need On-Site Maintenance Vehicle | | | | | | | |

| GENERAL OFF-SITE: | CAPACITY | SQ. FT./PERSON | INT. SQ. FT. | EXT. SQ. FT. | \$/ SQ. FT. | COST | TOTAL |
|---|----------|----------------|--------------|--------------|-------------|-----------|--------------|
| Water - 8000 LF @ \$50/LF from Blue Diamond | | | | | | \$400,000 | |
| Hook-Up Fee - Amara District | | | | | ASSUME | \$50,000 | |
| Electric - 300 LF @ underground from road | | | | | ASSUME | \$45,000 | |
| Sub-Totals | | | | | | | \$495,000 |
| Sub-Total Building - On-Site/ Off-Site | | | | | | | \$12,538,125 |

PROGRAM & BUDGET SUMMARY

| PROGRAM AREAS | CAPACITY | INT. SQ. FT. | EXT. SQ. FT. | COST | TOTAL |
|---|----------|---------------|---------------|-------------|---------------------|
| Entry and Administration | | 3,450 | | \$438,000 | |
| Fitting & Laundry | | 2,200 | | \$264,000 | |
| Residential | 273 | 31,185 | | \$4,028,625 | |
| Dining & Kitchen | 150 | 7,200 | 3,000 | \$1,155,000 | |
| Classroom & Lab | 425 | 7,395 | 1,375 | \$1,434,000 | |
| Observatory | | 1,200 | 1,200 | \$800,000 | |
| Wild Horse & Burro | | 800 | 7,200 | \$76,000 | |
| Electrical and Maintenance | | 2,320 | | \$232,000 | |
| Waste Water Treatment | | 1,600 | | \$160,000 | |
| General On-Site | | | | \$3,375,500 | |
| General Off-Site | | | | \$475,000 | |
| Sub-Total Building - On-Site/ Off-Site | | 57,350 | 12,775 | | \$12,438,125 |
| Note: All program areas include outdoor functions | | | | | |

| CONTRACTOR'S FEES | | | | % | COST | TOTAL |
|---|--|--|--|--------|---------------------|---------------------|
| Contractor's General Conditions | | | | 7.5% | \$932,859 | |
| Contractor's Fees | | | | 7.5% | \$932,859 | |
| Sub-Total | | | | | \$14,303,844 | |
| Pre-Planning - EIR | | | | | \$50,000 | |
| OTHER FEES & PROJECT COSTS | | | | | | |
| Master Planning - programming spent to date | | | | | \$85,000 | |
| Architectural & Engineering | | | | 8.0% | \$1,144,308 | |
| Reimbursable Expenses - 5% of Fee | | | | | \$57,215 | |
| Sub-Total | | | | | | \$1,286,523 |
| Sub-Total: Building, Site & Fees | | | | | | \$15,640,367 |
| EQUIPMENT & INTERIORS | | | | | | |
| Vans - 7 x \$30,000 | | | | ASSUME | \$210,000 | |
| Maintenance & Site Vehicles | | | | ASSUME | \$150,000 | |
| 60,000 Sq. Ft. x \$12 psf | | | | | \$720,000 | |
| Design fees - Inc. purchasing & Installation | | | | 20.0% | \$144,000 | |
| Sub-Total | | | | | | \$1,224,000 |
| TOTAL : all costs, without contingency | | | | | | \$16,864,367 |
| Project Contingency - 10% of all costs | | | | 10.0% | \$1,686,437 | |
| TOTAL PROJECT COSTS | | | | | | \$18,550,803 |
| Note: Not included are land costs, construction interest, owner's insurance | | | | | | |

Preliminary Budget and Program Wild Horse and Burro Facilities
(Appendix VI of Oliver Ranch Feasibility Study)

| GENERAL OFF-SITE: | QUANTITY | UNITS | \$/ SQ. FT. | COST | TOTAL |
|---|----------|------------|----------------|-----------|-------------|
| Water - 6" Line | 3,000 | Linear Ft. | \$50 | \$150,000 | |
| Hook-Up Fee - Water District | | | ASSUME | \$15,000 | |
| Electric underground from Bonnie Springs Road | | | ASSUME | \$10,000 | |
| Path to Science School - 6' wide X 3000 Linear Ft. | 18,000 | Sq. Ft. | \$1.50 | \$27,000 | |
| Sub-Total: | | | | | \$202,000 |
| GENERAL ON-SITE: | QUANTITY | UNITS | UNIT COST (\$) | COST | TOTAL |
| 13.5 Acres | | | | | |
| Site Work - grading, utility distribution, lighting, paths, landscaping, irrigation, patios, newveys, & soils | 10 | Acres | \$50,000 | \$500,000 | |
| Water Storage - 10,000 Gallons | | | ASSUME | \$15,000 | |
| Standby Diesel Generator | | | ASSUME | \$125,000 | |
| Roads, Driveways, Ramps (Note - Extruded Engineered Mix) | 60,000 | Sq. Ft. | \$1.50 | \$90,000 | |
| Parking - 100 Cars & Trailers | 35,000 | Sq. Ft. | \$1.50 | \$52,500 | |
| Septic System | 2 | Systems | \$40,000.00 | \$80,000 | |
| Runoff Catch Basins | | | ASSUME | \$25,000 | |
| Helipad - Conc. W/ Elec. | 1,000 | Sq. Ft. | \$7.50 | \$7,500 | |
| Sub-Total: | | | | | \$895,000 |
| Sub-Total Building - On-Site/ Off-Site | | | | | \$1,097,000 |

FACILITIES

| RESIDENT HORSE BARN: | QUANTITY | UNITS | UNIT COST (\$) | COST | TOTAL |
|-----------------------------------|----------|------------|----------------|-----------|-----------|
| Horse Barn / Tack Room | 2,000 | Sq. Ft. | \$75 | \$150,000 | |
| 4" Sand Floor over 6" Gravel Base | 2,000 | Sq. Ft. | \$2.50 | \$5,000 | |
| Sub-Total: | | | | | \$155,000 |
| AMPHITHEATER & ARENA | QUANTITY | UNITS | UNIT COST (\$) | COST | TOTAL |
| Fabric Roof | 13,000 | Sq. Ft. | \$35 | \$455,000 | |
| 4" Sand Floor over 6" Gravel Base | 13,000 | Sq. Ft. | \$2.50 | \$32,500 | |
| Open Metal Fencing 7' High | 500 | Linear Ft. | \$50 | \$25,000 | |
| Permanent Seats | 100 | Seats | \$150 | \$15,000 | |
| Lighting | 15,000 | Sq. Ft. | \$2.50 | \$37,500 | |
| Entry/Control Area | | | ASSUME | \$10,000 | |
| Sub-Total: | | | | | \$575,000 |

FACILITIES (CONTINUED)

| OFFICE | QUANTITY | UNITS | UNIT COST (\$) | COST | TOTAL |
|--|-----------------|--------------|-----------------------|-------------|------------------|
| Office w/ HVAC | 1,000 | Sq. Ft. | \$150 | \$150,000 | |
| Office Equipment & Furniture | 1,000 | Sq. Ft. | \$25 | \$25,000 | |
| Sub-Total: | | | | | \$175,000 |
| HOLDING PENS/CHUTES | QUANTITY | UNITS | UNIT COST (\$) | COST | TOTAL |
| 4" Sand Floor over 6" Gravel Base | 8,000 | Sq. Ft. | \$2.50 | \$20,000 | |
| Open Metal Fencing 7' High | 360 | Linear Ft. | \$50 | \$18,000 | |
| Sorting Chutes | | | ASSUME | \$40,000 | |
| Sub-Total: | | | | | \$78,000 |
| CORRAL | QUANTITY | UNITS | UNIT COST (\$) | COST | TOTAL |
| 4" Sand Floor over 6" Gravel Base | 30,000 | Sq. Ft. | \$2.50 | \$75,000 | |
| Open Metal Fencing 7' High | 800 | Linear Ft. | \$50 | \$40,000 | |
| Sub-Total: | | | | | \$115,000 |
| ANIMAL INFIRMARY | QUANTITY | UNITS | UNIT COST (\$) | COST | TOTAL |
| Interior Space w/ Office, HVAC | 2,000 | Sq. Ft. | \$200.00 | \$400,000 | |
| Equipment & Furniture | | | ASSUME | \$200,000 | |
| Exterior - 4" Sand Floor over 6" Gravel Base | 2,000 | Sq. Ft. | \$2.50 | \$5,000 | |
| Open Metal Fencing 7' High | 180 | Linear Ft. | \$50.00 | \$9,000 | |
| Lighting | | | ASSUME | \$3,000 | |
| Sub-Total: | | | | | \$617,000 |
| PASTURE | QUANTITY | UNITS | UNIT COST (\$) | COST | TOTAL |
| Remains Natural Grade | 85,000 | Sq. Ft. | \$0.00 | \$0 | |
| Open Metal Fencing 7' High | 1,200 | Linear Ft. | \$50 | \$60,000 | |
| Sub-Total: | | | | | \$60,000 |

FACILITIES (CONTINUED)

| MISC. | QUANTITY | UNITS | UNIT COST (\$) | COST | TOTAL |
|---|-----------------|--------------|-----------------------|-------------|--------------------|
| R.V. Site Hookup/Pad | | | ASSUME | \$6,000 | |
| Entry Signage & Gates | | | ASSUME | \$10,000 | |
| Panel Storage | 400 | Sq. Ft. | \$25 | \$10,000 | |
| Equipment Garage - No HVAC, Conc. Floor, Elec., H2O, Bathroom | 1,000 | Sq. Ft. | \$75.00 | \$75,000 | |
| Hay Storage - Tent Cover w/ Conc. Floor, Lighting, & Open Sides | 800 | Sq. Ft. | \$40 | \$32,000 | |
| Sub-Total: | | | | | \$133,000 |
| Facilities Total: | | | | | \$1,908,000 |
| Facilities, On-Site, & Off-Site Total: | | | | | \$3,005,000 |

| CONTINGENCY | | | % | COST | TOTAL |
|--------------------|--|--|----------|-------------|--------------------|
| Contingency | | | 10.0% | \$300,500 | |
| Sub-Total: | | | | | \$3,305,500 |

| FEES | | | % | COST | |
|---|--|--|----------|-------------|--------------------|
| Contractor's Fee & General Conditions | | | 15.0% | \$495,825 | |
| Consultant's Fees | | | 9.0% | \$297,495 | |
| Reimbursable Expenses - 5% of Consultant Fees | | | | \$14,875 | |
| Sub-Total | | | | | \$808,195 |
| TOTAL PROJECT COSTS | | | | | \$4,113,695 |
| Note: Not included are land costs, construction interest, owner's insurance on-site maintenance equipment or vehicles (trailers, trucks, R.V.s, tractors) | | | | | |

Appendix B

Sense of Place and Sustainable Design Concepts

(Adapted from the Oliver Ranch Feasibility Study, pp 87-94)

The environmental design concepts [to be incorporated in the ORSS complex] are broken down in the following categories: Site, Water, Energy and Air, and Materials. *The LEED Green Building Rating System™* and the *Energy Design for High Performance Schools in Hot and Dry Climates* were used as references in developing these concepts.

Site

At the early stage in the planning, most of the concepts focused on responses to the site primarily due to the macro scale at which the design team worked. The following concepts focus not only on preservation of the physical site, but also some of its history.

- Utilize pieces of the existing structures, especially the stone walls, as part of new buildings or outdoor rooms.
- Keep and utilize the benefits of the existing trees of the site, many of which are deciduous and will block out the intense summer sun, while letting in the winter sun.
- Utilize the already impacted areas of the site, such as the paths and flat pads, thus reducing grading, and retaining some memory of the existing ranch layout.
- Keep buildings within the existing boundaries of the immediate site to minimize impacting the surroundings.
- Preserve the natural spring and stream, which are only present during certain times of the year.
- Minimize the vehicular access at the school to reduce impact and maintain the sense of place. Vehicles will be limited to an entry drop-off point and parking in service areas. These vehicular areas will be located on the part of the site closest to the road. An attempt will be made to keep them primarily out of sight. Limiting vehicles on the site will reduce air pollutants such as fumes and dust.
- Collect and filter water runoff from the parking lot so as to not contaminate the site
- Create an entry area that allows for a period of adjustment for students to be oriented to their surroundings once they've arrived
- Minimize building footprints- smaller spaced out buildings reduce impact on the site. Maximize exterior spaces between buildings to take in the natural environment as much as possible. The feeling is to be of an outdoor school comprised of paths and places.
- Locate residential buildings on the portion of the site furthest away from the road, to avoid noise, to take advantage of views, and create a sense of emersion and security.
- Create indoor/outdoor connections by maximizing views and rooms that extend to the outside.

Water

Water is a precious resource in the desert and therefore it is essential to reduce, reuse, and recycle it. The following concepts will help reduce water consumption at the school:

- Incorporate native and drought resistant plants and xeriscape principals to reduce the need for irrigation.
- Build an onsite wastewater treatment plant (gray water system), which will recycle water from plumbing fixtures for non-potable reuse such as toilet flushing.
- Use water conserving plumbing fixtures to maximize water efficiency.
- Use non-flushing waterless urinals to reduce water utilization.
- Build ground water and rainwater monitoring stations.

Energy and Air

Designing buildings to reduce energy consumption is both an environmental issue, and a financial issue. Incorporating the following sustainable energy systems and concepts will dramatically decrease the operational costs throughout the life of the school:

- Orient buildings along an east-west access. Buildings should be rectilinear in shape with the long sides facing south and north. Maximize well-controlled south facing glass which will shield out the high summer sun and take in the low winter sun – this will provide natural day lighting within the buildings and will reduce the need for mechanical heating and cooling.
- Construct the buildings primarily of massive masonry walls rather than wood framing thus delaying thermal heat gains. Heat absorbed by the walls during the day will not penetrate into the buildings' interiors until the evening, thereby heating the building at night.
- Utilize natural ventilation and nighttime cooling strategies whenever possible to reduce and often eliminate the need for mechanical air conditioning – this also helps improve indoor air quality.
- Maximize day lighting in buildings. This reduces energy costs and it has been proven that naturally lit spaces increase learning in students.
- Utilize photovoltaic cells placed on the roofs of buildings to generate as much of the school's own power as possible. The power generated from the solar panels can be significant due to the desert climate. This system could be hooked up to the grid, which would allow the school to receive rebates from the power company for excess power generation.
- Consider the use of wind turbines on the school as a power generating option.

Materials

Selecting the proper materials with which to build the school plays a major role in creating a sense of place that is in tune with the desert ecology and the historical significance of the existing buildings at the school. Utilizing materials that are environmentally friendly us

also crucial to creating a sustainable school. It is important that the school also promotes an awareness of how the material waste was generated at the school impacts both the local and globe environment.

- Integrate and make very accessible recycling areas at the school.
- Use alternative methods, such as composting and fertilization for a greenhouse for food and waste disposal.
- Reuse existing buildings or parts of existing buildings for historical and environmental purposes.
- Use similar materials for the new structures as in the existing buildings so they integrate well with the old ranch and surrounding desert.
- Use materials of recycled content whenever possible.

When implementing all of these concepts, a concerted effort will be made to make them part of the learning experience – to teach how the built environment can be environmentally responsible.